Date: 2023-04-01

# Aim:

S.No: 1

Design a C program which reverses the given number.

# **Source Code:**

```
reverse.c
#include<stdio.h>
int main()
        int n,rem=0,rev=0;
        scanf("%d",&n);
         while(n>0)
                rem=n%10;
                rev=rev*10+rem;
                n=n/10;
          printf("Reversed number= %d",rev);
         return 0;
}
```

# Execution Results - All test cases have succeeded!

```
Test Case - 1
User Output
Reversed number= 654
```

```
Test Case - 2
User Output
958745
Reversed number= 547859
```

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Exp. Name: Write a C program to find second largest for the given numbers

Date: 2023-04-02

### Aim:

S.No: 2

Design a C program which finds the second maximum number among the given one dimensional array of elements.

```
Sample Input and Output:Enter how many values you want to read : 6
Enter the value of a[0] : 45
Enter the value of a[1] : 24
Enter the value of a[2] : 23
Enter the value of a[3] : 65
Enter the value of a[4] : 78
Enter the value of a[5] : 42
The second largest element of the array = 65
```

Note:Do use the **printf()** function with anewline character (\n) at the end.

# **Source Code:**

```
second_large.c
#include<stdio.h>
void main()
        int i,n,a[20],max1=0,max2=0;
        printf("Enter how many values you want to read : ");
        scanf("%d",&n);
        for(i=0;i<n;i++)</pre>
                 printf("Enter the value of a[%d] : ",i);
                 scanf("%d",&a[i]);
        for(i=0;i<n;i++)
                 if(max1<a[i])</pre>
                 {
                         max2=max1;
                         max1=a[i];
}
else if (a[i]>max2&&a[i]<max1)</pre>
{
        max2=a[i];
}
}
printf("The second largest element of the array = %d\n", max2);
```

# Execution Results - All test cases have succeeded!

# Test Case - 1

**User Output** 

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Enter how many values you want to read :
4
Enter the value of a[0] :
32
Enter the value of a[1] :
25
Enter the value of a[2] :
69
Enter the value of a[3] :
47
The second largest element of the array = 47

Exp. Name: Write a program which finds the kth smallest number among the given list of numbers.

Date: 2023-04-02

### Aim:

S.No: 3

Write a program which finds thek<sup>th</sup>smallest number among the given one dimensional array.

# Sample Input and Ouput:

```
Enter how many values you want to read : 5
Enter the value of a[0] : 20
Enter the value of a[1] : 30
Enter the value of a[2] : 16
Enter the value of a[3] : 15
Enter the value of a[4] : 1
Enter which smallest element you want: 2
16 is the 2th smallest element
```

Hint: Thek<sup>th</sup> element refers to the index.

# **Source Code:**

```
smallest.c
#include<stdio.h>
int main()
{
        int a[20],i,n,j,kth,temp,pos;
        printf("Enter how many values you want to read : ");
        scanf("%d",&n);
        for(i=0;i<n;i++)</pre>
                 printf("Enter the value of a[%d] : ",i);
                 scanf("%d",&a[i]);
        }
        printf("Enter which smallest element you want: ");
        scanf("%d",&kth);
        for(i=0;i<n;i++)</pre>
        {
                 pos=i;
                 for(j=i+1;j<n;j++)</pre>
                 if(a[j]<a[pos])</pre>
                         pos=j;
                 }
                 temp=a[i];
                 a[i]=a[pos];
                 a[pos]=temp;
}
        printf("%d is the %dth smallest element",a[kth],kth);
```

Execution Results - All test cases have succeeded!

Test Case - 1

**User Output** 

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```
Enter how many values you want to read :
Enter the value of a[0] :
Enter the value of a[1] :
30
Enter the value of a[2] :
Enter the value of a[3] :
Enter the value of a[4]:
Enter which smallest element you want:
16 is the 2th smallest element
```

# Test Case - 2 **User Output** Enter how many values you want to read : Enter the value of a[0] : Enter the value of a[1] : Enter the value of a[2] : Enter the value of a[3] : Enter the value of a[4]: Enter the value of a[5] : 15 Enter which smallest element you want: 74 is the 4th smallest element

# Aim:

Design an algorithm and implement using C language the following exchanges  $\mathbf{a} \leftarrow \mathbf{b} \leftarrow \mathbf{c} \leftarrow \mathbf{d} \leftarrow \mathbf{a}$  and print the result as shown in the example.

```
Sample Input and Output:
Enter values of a, b, c and d: 98 74 21 36
After swapping
a = 74
b = 21
c = 36
d = 98
```

# **Source Code:**

```
exchange.c

#include<stdio.h>
main()
{
    int a,b,c,d,temp;
    printf("Enter values of a, b, c and d: ");
    scanf("%d%d%d",&a,&b,&c,&d);
    temp=a;
    a=b;
    b=c;
    c=d;
    d=temp;
    printf("After swapping\na = %d\nb = %d\nc = %d\nd = %d\n",a,b,c,d);
}
```

# Execution Results - All test cases have succeeded!

```
Test Case - 1

User Output

Enter values of a, b, c and d:

1234

After swapping

a = 2

b = 3

c = 4

d = 1
```

```
Test Case - 2

User Output

Enter values of a, b, c and d:

98 74 21 36

After swapping
```

	b = 21
	c = 36
Γ	d = 98

Aim:

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Develop a C Program which counts the number of positive and negative numbers separately and also compute the sum of them.

```
Sample Input and Output:

How many numbers you want to add : 6

Enter number a[0] : 3

Enter number a[1] : 5

Enter number a[2] : -5

Enter number a[3] : 7

Enter number a[4] : -8

Enter number a[5] : 6

Count of positive numbers = 4

Sum of positive numbers = 21

Count of negative numbers = 2

Sum of Negative numbers = -13
```

# **Source Code:**

```
count.c
```

```
#include<stdio.h>
int main()
        int a[20],n,i,sump=0,sumn=0,countp=0,countn=0;
        printf("How many numbers you want to add : ");
        scanf("%d",&n);
        for(i=0;i<n;i++)
                printf("Enter number a[%d] : ",i);
                scanf("%d",&a[i]);
        for(i=0;i<n;i++)</pre>
                if(a[i]>0)
                {
                        sump+=a[i];
                        countp=countp+1;
                }
                else
                {
                        sumn+=a[i];
                        countn=countn+1;
                }
        printf("Count of positive numbers = %d\n",countp);
        printf("Sum of positive numbers = %d\n",sump);
        printf("Count of negative numbers = %d\n",countn);
        printf("Sum of Negative numbers = %d\n",sumn);
}
```

**Execution Results** - All test cases have succeeded!

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Test Case - 1
User Output
How many numbers you want to add :
5
Enter number a[0] :
4
Enter number a[1] :
5
Enter number a[2] :
6
Enter number a[3] :
2
Enter number a[4] :
6
Count of positive numbers = 5
Sum of positive numbers = 23
Count of negative numbers = 0
Sum of Negative numbers = 0

# Test Case - 2 **User Output** How many numbers you want to add : Enter number a[0] : Enter number a[1] : -1 Enter number a[2] : -3 Enter number a[3] : Count of positive numbers = 0 Sum of positive numbers = 0Count of negative numbers = 4 Sum of Negative numbers = -10

Aim:

Implement the C program which computes the sum of the first n terms of the series

```
Sum = 1 - 3 + 5 - 7 + 9 + ...
```

# Sample Input and Output - 1:

```
Enter the value of n: 99
The sum of first 99 terms of the series is: 99
```

### **Source Code:**

```
sum.c
#include<stdio.h>
void main()
        int n,i,sum=0,sumn=0,sump=0;
        printf("Enter the value of n: ");
        scanf("%d",&n);
        for(i=0;i<n;i++)
                if(i%2==0)
                {
                        sump+=2*i+1;
                }
                else
                {
                        sumn+=-(2*i+1);
                }
        sum=sump+sumn;
        printf("The sum of first %d terms of the series is: %d\n",n,sum);\\
```

# Execution Results - All test cases have succeeded!

```
Test Case - 1
User Output
Enter the value of n:
The sum of first 789 terms of the series is: 789
```

```
Test Case - 2
User Output
Enter the value of n:
76
```

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Test Case - 3	
User Output	
Enter the value of n:	
99	
The sum of first 99 terms of the series is: 99	

Exp. Name: Design a C program which determines factorial of numbers

Date: 2023-04-18

### Aim:

S.No: 7

Design a C program which determines the numbers whose factorial values are between(including) minimum and maximum values.

For example: The value of 6! is 720, 7! is 5040 and 8! is 40320. The factorial of 7 (5040) exists between the given limits.

Constraints:1 <= min,max <= 103

Instruction: Your input and output layout must match exactly with the layout of the visible sample test cases. **Source Code:** 

```
factorial.c
#include<stdio.h>
int main()
{
        int fact=1,i,max,min,x=1;
        printf("Min: ");
        scanf("%d",&min);
        printf("Max: ");
        scanf("%d",&max);
        printf("Values: ");
        for(i=1;i<=max;i++)</pre>
        fact=fact*i;
        if(fact>=min&&fact<=max)</pre>
        if(x==1)
        printf("%d ",i);
        x=0;
}
        else
        printf("%d ",i);
}
}
        printf("\n");
}
```

# **Execution Results** - All test cases have succeeded!

Test Case - 1		
User Output		
Min:		
5		
Max:		
10		

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Values: 3

Test Case - 2		
User Output		
Min:		
5		
Max:		
29		
Values: 3 4		

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Date: 2023-04-02

### Aim:

```
Design an algorithm and implement using a C program which finds the sum of the infinite series
1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + \dots
```

Print the result as shown in the example.

# Sample Input and Output:

```
Enter the value of x and n: 4 5
sum = 3.666667
```

### **Source Code:**

```
infinite.c
#include<stdio.h>
#include<math.h>
int main()
        int x,n,m,i=0,fact=1;
        float k,sum=0;
        printf("Enter the value of x and n: ");
        scanf("%d%d",&x,&n);
        while(i<=n)
                if(i%2==0)
                {
                        fact=1;
                        for(m=1;m<=i;m++)
                                fact=fact*m;
                        k=(pow(x,i))/fact;
                }
                        if(i%4!=0)
                                fact=1;
                                for(m=1;m<=i;m++)
                                        fact=fact*m;
                                }
                                k=-(pow(x,i))/fact;
                        sum=sum+k;
                        i=i+2;
                printf("sum = %f",sum);
```

Execution Results - All test cases have succeeded!

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	Test Case - 2	
User Output		
Enter the value of x and n:		
12 5		
sum = 793.000000		

Exp. Name: **Design a C program to print the** S.No: 9 sequence of numbers in which each number is the sum of the three most recent predecessors

Date: 2023-04-06

### Aim:

Design a C program to print the sequence of numbers in which each number is the sum of the three most recent predecessors. Assume first three numbers as **0**, **1**, and **1**, print the result as shown in the example.

# Sample Input and Output:

```
Enter the number of terms: 7
First 7 terms in the series are:
```

# **Source Code:**

```
first.c
#include<stdio.h>
int main()
{
        int t1=0,t2=1,t3=1,t4,n,i;
       printf("Enter the number of terms: ");
        scanf("%d",&n);
       printf("First %d terms in the series are:",n);
       printf("\n%d\n%d\n",t1,t2,t3);
        for(i=4;i<=n;i++)</pre>
                t4=t1+t2+t3;
                printf("%d\n",t4);
                t1=t2;
                t2=t3;
                t3=t4;
        }
       return 0;
}
```

# Execution Results - All test cases have succeeded!

Test Case - 1
User Output
Enter the number of terms:
5
First 5 terms in the series are:
0
1
1
2

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Test Case - 3		
User Output		
Enter the number of terms:		
13		
First 13 terms in the series are:		
0		
1		
1		
2		
4		
7		
13		
24		
44		
81		
149		
274		
504		

S.No: 10

Exp. Name: Write a C program to convert a Decimal number into binary, octal and hexadecimal number using a single user defined function.

Date: 2024-01-27

### Aim:

Write a C program to convert a Decimal number into binary, octal and hexadecimal number using a single user defined function.

At the time of execution, the program should print the message on the console as:

```
Enter a positive decimal number :
```

```
For example, if the user gives the input as:
```

Enter a positive decimal number: 789

then the program should print the result as:

# The binary number of decimal 789 is: 1100010101

```
The octal number of decimal 789 is : 1425
The hexadecimal number of decimal 789 is : 315
```

Note: Do use the **printf()** function with a **newline** character (\n) at the end.

### **Source Code:**

```
oche.c
```

```
#include<stdio.h>
#include<math.h>
int main(){
        int n,s,temp,bin[100],i,j;
       printf("Enter a positive decimal number : ");
       scanf("%d",&n);
        s=2*n;
        s=s/2;
        temp=s;
        for(i=0;s>0;i++)
               {
                        bin[i]=s%2;
                        s=s/2;
                }
        printf("The binary number of decimal %d is : ",temp);
        for(j=i-1;j>=0;j--)
                printf("%d",bin[j]);
        printf("\n");
        printf("The octal number of decimal %d is : %o\n",n,n);
        printf("The hexadecimal number of decimal %d is : %X\n",n,n);
```

# Execution Results - All test cases have succeeded!

# Test Case - 1

# **User Output**

Enter a positive decimal number :

45

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The binary number of decimal 45 is : 101101
The octal number of decimal 45 is : 55
The hexadecimal number of decimal 45 is : 2D

Test Case - 2	
User Output	
Enter a positive decimal number :	
10	
The binary number of decimal 10 is : 1010	
The octal number of decimal 10 is : 12	
The hexadecimal number of decimal 10 is : A	

Test Case - 3	
User Output	
Enter a positive decimal number :	
6789	
The binary number of decimal 6789 is : 1101010000101	
The octal number of decimal 6789 is : 15205	
The hexadecimal number of decimal 6789 is : 1A85	

Date: 2023-04-03

### Aim:

Develop an algorithm which computes the all the factors between 1 to 100 for a given number and implement it using C.

# Sample input output

# Sample input output -1:

```
Enter a number: 23
Factors between 1 and 100 are: 1
```

### Sample input output -2:

```
Enter a number: 234
Factors between 1 and 100 are: 1
                              2 3 6 9 13 18 26 39 78
```

# Sample input output -3:

```
Enter a number: 5
Factors between 1 and 100 are: 1
```

Note: Do use the printf() function with a newline character (\n) at the end.

# **Source Code:**

```
factors100.c
#include<stdio.h>
main()
        int i,n;
        printf("Enter a number: ");
        scanf("%d",&n);
        printf("Factors between 1 and 100 are: ");
        for(i=1;i<=100;i++)
                if(n%i==0)
                printf("%d\t",i);
        printf("\n");
        return 0;
}
```

# Execution Results - All test cases have succeeded!

	Test C	Case - 1				
User Output						
Enter a number:						
45						
Factors between 1 and 100 are: 1	3	5	9	15	45	

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### Aim:

Construct an algorithm which computes the sum of the factorials of numbers between m and n

# **Constraints:**

m < n

# Sample input output

# Sample input output -1:

```
Enter m value: 3
Enter n value: 1
m value should be less than n
```

# Sample input output -2:

```
Enter m value: 4
Enter n value: 6
Sum of factorials of numbers between 4 and 6 is 864
```

### Sample input output -3:

```
Enter m value: 10
Enter n value: 13
Sum of factorials of numbers between 10 and 13 is 6749568000
```

Note: Do use the printf() function with a newline character ( $\n$ ) at the end.

Note: Use an appropriate data type for the variable storing the sum to accommodate large factorial values. Source Code:

fact.c

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```
#include<stdio.h>
main()
{
        long int m,n,k,i,fact=1,sum=0;
       printf("Enter m value: ");
        scanf("%ld",&m);
       printf("Enter n value: ");
       scanf("%ld",&n);
       if(m<n)
        {
                printf("Sum of factorials of numbers between %ld and %ld is ",m,n);
               for(k=m;k<=n;k++)
                {
                       fact=1;
                       for(i=k;i>=1;i--)
                       {
                               fact=fact*i;
                       }
                       sum=sum+fact;
               printf("%ld\n",sum);
        }
        else
       printf("m value should be less than n\n");
       return 0;
}
```

# Execution Results - All test cases have succeeded!

# Test Case - 1 **User Output** Enter m value: 10 Enter n value: Sum of factorials of numbers between 10 and 13 is 6749568000

```
Test Case - 2
User Output
Enter m value:
Enter n value:
m value should be less than n
```

S.No: 13

Aim:

Write a program to **print** the given integer elements of an array (with max size 10) in reverse order.

At the time of execution, the program should print the message on the console as:

Enter size of the array:

For example, if the user gives the **input** as:

Enter size of the array : 3

Next, the program should **print** the message on the console as:

Enter array elements :

If the user gives the **input** as:

Enter array elements : 10 20 30

then the program should print the result as:

Array elements in reverse order : 30 20 10

[**Hint:** First read an integers from standard input into the array and then use a loop to iterate on that array in the reverse order (meaning starting from the last element till the first) to print the elements.]

Note: Do use the printf() function without a newline character (\n).

### **Source Code:**

```
print.c
#include<stdio.h>
main()
{
        int k,a[100],n,b;
        printf("Enter size of the array : ");
        scanf("%d",&n);
        int size = a[n];
        printf("Enter array elements : ");
        for(k=0;k<n;k++)
                scanf("%d",&a[k]);
        }
        printf("Array elements in reverse order : ");
        for(k=n-1;k>=0;k--)
        {
                printf("%d ",a[k]);
        printf("\n");
        return 0;
```

# Execution Results - All test cases have succeeded!

```
Test Case - 1

User Output

Enter size of the array :

3
```

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Enter array elements :
10 20 30
Array elements in reverse order : 30 20 10

Test Case - 2	
User Output	
Enter size of the array :	
6	
Enter array elements :	
11 88 66 22 33 44	
Array elements in reverse order : 44 33 22 66 88 11	

Date: 2023-04-03

# Aim:

Take a list of n numbers, Design an algorithm which prints the number of stars equivalent to the value of the number. The stars for each number should be printed horizontally.

# Sample input output

```
Sample input output -1:
Enter the number of numbers: 6
Enter number 1: 4
Enter number 2: 6
Enter number 3: 9
Enter number 4: 5
Enter number 5: 2
Enter number 6: 6
****
*****
******
****
*****
Sample input output -2:
Enter the number of numbers: 4
Enter number 1: 4
Enter number 2: 2
Enter number 3: 1
Enter number 4: 3
****
**
```

**Note:** Do use the printf() function with a newline character (\n) at the end.

# **Source Code:**

```
star.c
```

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```
#include<stdio.h>
main()
{
         int n,j,i,a[10];
         printf("Enter the number of numbers: ");
         scanf("%d",&n);
         for(i=0;i<n;i++)
         {
                  printf("Enter number %d: ",i+1);
                  scanf("%d",&a[i]);
         }
         for(i=0;i<n;i++)</pre>
         {
                  \texttt{for}(\texttt{j=1};\texttt{j<=a[i]};\texttt{j++})
                           printf("*");
                  printf("\n");
         }
}
```

# Execution Results - All test cases have succeeded!

```
Test Case - 1
User Output
Enter the number of numbers:
Enter number 1:
Enter number 2:
Enter number 3:
9
Enter number 4:
Enter number 5:
2
Enter number 6:
6
****
*****
****
*****
```

# Test Case - 2

**User Output** 

Date: 2023-04-03

Aim: Illustrate the use of auto variable.

The variables defined using auto storage class are called as local variables.

Auto stands for automatic storage class. A variable is in auto storage class by default if it is not explicitly

The scope of an auto variable is **limited with the particular block only.** 

Once the control goes out of the block, the access is destroyed. This means only the block in which the auto variable is declared can access it.

A keyword auto is used to define an auto storage class. By default, an auto variable contains a garbage value. Follow the instructions given in the comment lines to declare auto variables and print their values at different places in the program.

# **Source Code:**

```
auto.c
#include<stdio.h>
void main() {
       auto int d=10;
       // Declare an auto variable d of type integer.
       // Print the value of d.
                auto int d=4;
                // Declare and initialize the auto variable d with 4.
                {
                        auto int d=6:
                        // Declare and initialize the auto variable d with 6/
                        printf("d=%d\n",d);
                        // Print the value of d.
                printf("d=%d\n",d);
                // Print the value of d.
        printf("d=%d\n",d);
```

# Execution Results - All test cases have succeeded!

Test Case - 1	
User Output	
32767	
6	
4	

### Aim:

Illustrate the use of register variables.

- You can use the register storage class when you want to store local variables within functions or blocks in CPU registers instead of RAM to have quick access to these variables. For example, "counters" are a good candidate to be stored in the register.
- The keyword register is used to declare a register storage class. The variables declared using register storage class has lifespan throughout the program.
- It is similar to the auto storage class. The variable is limited to the particular block. The only difference is that the variables declared using register storage class are stored inside CPU registers instead of a memory. Register has faster access than that of the main memory.
- The variables declared using register storage class has no default value. These variables are often declared at the beginning of a program.
- Accessing the address of the register variables results in an error.

### Try it out

```
A statement like
int *ptr = &weight;
will result in an error like
int *ptr = &weight;
address of register variable 'weight' requested
```

Follow the instructions given in the comment lines to understand the working of register variables.

# **Source Code:**

```
register.c
#include <stdio.h>
void main() {
       register int weight;
       // Declare a register variable weight of type int.
       printf("The default weight value is: %d\n",weight);
       // Add the line described above to obtain the error.
       weight=65;
       printf("The current weight value is: %d\n",weight);
}
```

# Execution Results - All test cases have succeeded!

```
Test Case - 1
User Output
The default weight value is: 1024482696
```

Exp. Name: Design a C program that sorts the S.No: 28 Date: 2023-04-06 strings using array of pointers.

# Aim:

Design a C program that sorts the strings using array of pointers.

# Sample input output

Sample input-output -1: Enter the number of strings: 2 Enter string 1: Tantra Enter string 2: Code Before Sorting Tantra Code After Sorting Code Tantra Sample input-output -2: Enter the number of strings: 3 Enter string 1: India Enter string 2: USA Enter string 3: Japan Before Sorting India USA Japan After Sorting India Japan USA

# **Source Code:**

stringssort.c

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```
#include<stdio.h>
#include<stdlib.h>
#include<string.h>
void main()
{
        char * temp;
        int i,j,diff,num_strings;
        char * strarray[10];
        printf("Enter the number of strings: ");
        scanf("%d",&num_strings);
        if(num_strings>10)
        {
                printf("Sorry,maximum string allowed is %d. Defaulting",10);
                num_strings =10;
        for(i=0;i<num_strings;i++)</pre>
                printf("Enter string %d: ",i+1);
                strarray[i] =(char *) malloc(10 *sizeof(char));
                scanf("%s",strarray[i]);
        printf("Before Sorting\n");
        for(i=0;i<num_strings;i++)</pre>
        {
                printf("%s\n",strarray[i]);
        }
        sort(strarray,num_strings);
        printf("After Sorting\n");
        for(i=0;i < num_strings;i++){</pre>
                printf("%s\n",strarray[i]);
        }
        void sort(char *s[],int num_strings)
                char*temp;
                int item,i;
                for(item=0; item < num_strings; item++)</pre>
            temp=s[item];
                for(i=item;i > 0 && strcasecmp(s[i - 1],temp)>0;i--);
                {
                        memmove(&s[i + 1],&s[i],(item-i) * sizeof(char *));
                        s[i] =temp;
                }
        return 0;
```

# Execution Results - All test cases have succeeded!

# Test Case - 1

**User Output** 

	Test Case - 2
User Output	
Enter the number of strings:	
3	
Enter string 1:	
Dhoni	
Enter string 2:	
Kohli	
Enter string 3:	
Rohit	
Before Sorting	
Dhoni	
Kohli	
Rohit	
After Sorting	
Dhoni	
Kohli	
Rohit	

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